

University of Groningen

**Archimedes in the Middle Ages. Volume IV: A Supplement on the Medieval Latin Traditions of Conic Sections (1150-1566). Marshall Clagett**

North, J. D.

*Published in:*  
Isis

*DOI:*  
[10.1086/352976](https://doi.org/10.1086/352976)

**IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.**

*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
1982

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

North, J. D. (1982). Archimedes in the Middle Ages. Volume IV: A Supplement on the Medieval Latin Traditions of Conic Sections (1150-1566). Marshall Clagett. *Isis*, 73(2), 271-274.  
<https://doi.org/10.1086/352976>

**Copyright**

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

**Take-down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

---

Review: Seeing Archimedes through

Reviewed Work(s): Archimedes in the Middle Ages. Volume IV: A Supplement on the Medieval Latin Traditions of Conic Sections (1150-1566) by Marshall Clagett

Review by: J. D. North

Source: *Isis*, Vol. 73, No. 2 (Jun., 1982), pp. 271-274

Published by: The University of Chicago Press on behalf of The History of Science Society

Stable URL: <https://www.jstor.org/stable/231681>

Accessed: 11-12-2018 11:51 UTC

---

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



JSTOR

*The History of Science Society, The University of Chicago Press* are collaborating with JSTOR to digitize, preserve and extend access to *Isis*

## ESSAY REVIEWS

### Seeing Archimedes through

**Marshall Clagett.** *Archimedes in the Middle Ages*. Volume IV: *A Supplement on the Medieval Latin Traditions of Conic Sections (1150–1566)*. (Memoirs of the American Philosophical Society, 137.) 2 volumes. vii + 566 pp., illus., bibl., indexes. Philadelphia: American Philosophical Society, 1980. \$30.

With the publication of Volume IV of *Archimedes in the Middle Ages*, Marshall Clagett's monumental study of one of the most significant of medieval scientific traditions is completed. The importance of the work has already been recognized by the award of the Alexandre Koyré Medal of the International Academy of the History of Science (Bucharest, 1981). The first volume, dealing with the Arabo-Latin tradition, appeared from the University of Wisconsin Press as long ago as 1964, but the remaining volumes have all been published by the American Philosophical Society; and since in many large libraries the later parts of the work will therefore be filed (as parts of the *Memoirs* of the A.P.S.) in various places, it is worth reminding readers of its great size and scope. "Four volumes" is an unduly modest description of a work that is divided into eight separate tomes. The first began with a general discussion of medieval awareness of Archimedes. It included two translations of the *De mensura circuli*, several other emended versions of the same, texts and fragments based on the *De sphaera et cylindro*, and also the *Verba filiorum* of the Banū Mūsā. In Volume II Professor Clagett completed the main medieval textual tradition when he presented the first extensive medieval Latin versions of Archimedes, namely the translations from the Greek by William of Moerbeke. William was a Flemish Dominican who completed the translations in 1269 at Viterbo. The year was a crucial one for the knowledge of Archimedes in the West, for by then all the extant works of Archimedes (apart from the *Sandreckoner*, *On the Method*, *The Bovine Problem*, and the *Stomachion*) had been translated into Latin from Greek.

Broadly speaking, it is evident from the first two volumes that although Moerbeke's translations brought more of Archimedes to the notice of the Middle Ages than the translations from the Arabic had done, it was the latter that medieval scholars used most. The Moerbeke translations went beyond what men of the Middle Ages, for the most part, felt that they needed. Of course this did not apply to all of them, and especially interesting is the use made by Witelo, the Polish writer on optics, of the translations by his friend Moerbeke. For the most part, though, a university population which found much of Euclid incomprehensible was not destined to find Archimedes less so.

In Volume III Professor Clagett showed in detail how Western scholars reacted to the double medieval tradition, from around 1300 to around 1565. He investigated the Archimedean knowledge manifested by the Parisian mathematician and astronomer Jean de Murs in his *Quadripartitum numerorum* and in his *De arte mensurandi*. It seems that Nicole Oresme and Henry of Hesse were also using parts of the Moerbeke corpus. In Volume III we were introduced, furthermore, to the little-known French scholar Phillipus Elephantis. In the last and weightiest part of Volume III, alone coming to more than nine hundred pages, Professor Clagett introduced a whole bevy of familiar Renaissance scholars (between 1450 and 1565). He was not so much concerned to write a complete history of Archimedes

in the Renaissance, however, as to complete his study of the *medieval* Archimedes. If there was ever such a person as the ideal Renaissance scholar, he would certainly have viewed this section of Clagett's work with mixed feelings, for again and again it was shown there that Renaissance authors were often drawing on the medieval traditions rather than on Greek originals. The roll call included such names as Nicholas of Cusa, Regiomontanus, Piero della Francesca, Luca Pacioli, Giorgio Valla, Leonardo da Vinci, Andreas Coner, Niccolò Tartaglia, Federigo Commandino, and Francesco Maurolico. The first Greek edition appeared in Basle in 1544, with the translation of Jacobus Cremonensis, but this by no means put an end to the medieval complexion of Archimedean studies.

Textual purity apart, the sixteenth century was the great age of a renaissance of Archimedean *thought*. Problems of quadrature, spiral loci, specific gravity, and proportionality were not only rehearsed, but reworked, with enormously important consequences for mathematics and the physical sciences in later times. Running parallel with this lofty tradition, there is the humbler story of the incorporation of Archimedean subject matter into the handbooks of practical geometry produced in large numbers throughout the Middle Ages and Renaissance. And of course there is the minor theme of publication and printed editions.

The final volume of *Archimedes in the Middle Ages*, in two parts, is by way of a supplement to the first three volumes. In it Professor Clagett has brought together a considerable amount of material concerning the knowledge of conic sections in the Middle Ages and early Renaissance. Archimedes gives way to Apollonius as the chapters go by, and indeed the Archimedean content of Volume IV is rather slight. The volume opens with an analysis of two Latin works of Alhazen, the *De speculis comburentibus*, namely, a work on the mathematical theory and construction of paraboloidal mirrors, and the *Perspectiva*. To the first work its translator, Gerard of Cremona, prefaced a short fragment translated from the Arabic text of the introduction to Book I of Apollonius's *Conics*—avidly seized upon by medieval scholars. Clagett next returns to Witelo, and the knowledge of conic sections demonstrated in his *Perspectiva*, not to mention the possibility that William of Moerbeke provided Witelo with translations of the *Conics* of Apollonius and Eutocius's commentary on that work. (Clagett favors the idea of influence from Eutocius rather than from Pappus's *Collectio*.)

In the fourth chapter comes what, from the point of view of strictly medieval mathematics, is one of the most interesting tractates to be edited in the whole work—the so-called *Speculi almukefi compositio* (clearly not its original title). The originality of the work, while not overwhelming, is a comforting reminder that not all medieval mathematics was a question of thoughtless copying. The tract seems to have been produced towards the end of the thirteenth century or at the beginning of the fourteenth by a Latin author in a religious order. Simon Bredon, a Fellow of Merton College in the mid-fourteenth century, owned a copy. The work is interesting because its author sets out to reconstruct proofs of the two propositions of Apollonius's *Conics* (I 11 and I 35) that had been used by Alhazen and by later perspectivists (including Witelo) without proof. The new proofs seem to have been the first in the Latin language. The sense of struggle, in the absence of Apollonius's text—which the writer asked “brothers from distant parts” to seek out for him—is very revealing. Interesting too is the final section, in which he makes use of astronomico-trigonometrical concepts (sine and versed sine) in his justification for a construction for asymptotic lines. Without knowing the place of origin of this interesting little text, it is hard to read much importance into this terminology, but perhaps it is worth noting by way of example that Richard of Wallingford switched from the language of chords to the language of sines towards the end of the 1320s. I note too that out of the eleven *conclusiones* making up the

tract only one deals with a practical matter, but it takes up about one third of the whole, thus reinforcing the view that practical considerations were of great importance to most medieval scholars. The chapter in question is “to make an instrument by which the solid material of a burning mirror can be hollowed out in the form of a parabolic concavity.” A good deal is said in this chapter on the techniques for forging and hardening steel. When the tract was taken up by later writers, it seems to have been this pragmatic payoff that they valued most. A good example is Jean Fusoris, whose desire to turn Apollonian geometry into instruments sometimes outstripped his comprehension of the underlying theory. Note too Regiomontanus’s unfulfilled hope to write a work on burning mirrors, perhaps related to the fact that he produced a version of the *Speculi almukefi compositio*, albeit stripped of its pragmatic content.

The final chapters deal with the continuing influence of the medieval texts until the introduction of the Renaissance versions of the *Conics* of Apollonius. A case could be made for Johann Werner, the well-known Nuremberg mathematician (1468–1522), as the last writer to produce anything original out of the medieval tradition of conic sections. Werner seems to have taken things from Giorgio Valla, but also from the *Speculi almukefi compositio* (in Regiomontanus’s version), as well as from the short but influential anonymous work *De duabus lineis* translated by John of Palermo in the early thirteenth century. (This is also included, with a translation, in the present volume.) Clagett shows that Werner’s selection of the particular elements to be included in his work was largely governed by what was needed for those parts of his omnibus volume of 1522 on the duplication of the cube and the section of a sphere. If Werner’s work was not much cited, perhaps this was because translation of Apollonius soon rendered it superfluous. A writer who might have been expected to use Werner, but who seems not to have done so, was Albrecht Dürer, who treated briefly of conic sections in his *Underweysung der Messung* (Nuremberg, 1525). Again, it seems probable that he had access to the *Speculi almukefi compositio*, and again his interest seems to have been quite properly pragmatic and to have led to ingenious methods for drawing the conic sections. That key text was also at the root of a work by Oronce Fine, namely, *De speculo ustorio* (Paris, 1551). This text is seen by Clagett as “the culminating point of the Renaissance texts that stayed strictly within the medieval Latin traditions of conic sections,” although he underlines Fine’s deficiencies as a geometer. Clagett’s medieval story fades away as the sixteenth century wears on, more or less ending with the summaries and overtentious proofs of Francesco Barozzi in 1565–1566.

The overwhelming importance of Marshall Clagett’s compendious work rests on his ability—through a judicious selection of texts for editing and translating—to reduce by a substantial factor the disorder of medieval studies, a disorder inevitable in a subject where sources are scattered, fragmentary, anonymous, unpublished, and quite out of proportion to the number of scholars capable of handling them. Not only are Clagett’s texts well selected, well edited, and well translated; they are also provided with invaluable indexes of Latin terms. Inevitably in a work whose publication spans sixteen years, the final version is somewhat lacking in integration. A conflation of all the indexes, for example, would be an extremely valuable thing, although the publishers might reasonably consider this to be a request to gild the lily. An overall table of contents covering the eight bound volumes would make it easier to find one’s way around what is, from a textual point of view, a very complicated work. But more fundamentally, I should have been grateful for an attempt to summarize the mathematical contents of the works here edited, a matter all too easily lost to view amidst the commentaries, where the mathematics is slight and considerably diluted with discussion of complex textual

interdependence. Some themes, of course, stand out by the very frequency of their recurrence. In Volume IV, for instance, there is the recurrent theme of optical uses for conic sections. Clagett conjectures that concentration on this theme explains the failure to develop the material inherited by the Middle Ages from Archimedes and Eutocius on conic sections. (The main exceptions have already been mentioned—namely the two slender anonymous tracts and the work of Johann Werner.) There is clearly much more to be extracted from Clagett's splendid work than he extracts, but not immediately. It is a chart of an isolated part of an as yet dark continent. It will be drawn upon by future generations in the same way as his *Science of Mechanics in the Middle Ages* has been drawn upon. In the late sixteenth century Archimedes was a name to be set alongside Aristotle's. In the Middle Ages it was not. We now know pretty accurately how the change came about; but the history of mathematics in the late Middle Ages is concerned with much more than this question, and *Archimedes in the Middle Ages* is one of the most useful of potential sources of information on the broader issues. Its fate, like that of the medieval Archimedes, is something that only time will decide.

J. D. NORTH

*Filosofisch Instituut*  
*Rijksuniversiteit Groningen*  
*Groningen, The Netherlands*

### Seeing through the Enlightenment

**G. S. Rousseau; Roy Porter** (Editors). *The Ferment of Knowledge: Studies in the Historiography of Eighteenth-Century Science*. xiii + 500 pp., index. Cambridge/New York: Cambridge University Press, 1980. \$39.50.

The intellectual history of the eighteenth century, including the history of eighteenth-century science, used to be summed up in the term "Enlightenment". No one succeeded in defining the word precisely, but for most historians it served reasonably well to identify a set of opinions and enthusiasms that characterized the century. *The Ferment of Knowledge: Studies in the Historiography of Eighteenth-Century Science*, edited by G. S. Rousseau and Roy Porter, scarcely mentions the Enlightenment at all except to refer on one occasion to its "dark underbelly" (p. 192) and to change the traditional question "Was ist Aufklärung?" to "Wofür ist Aufklärung?" (p. 139). In its place the editors and authors seek a new historiography of the eighteenth century made possible by the changes in the history of science that have occurred during the past thirty years. They believe the historiography of the eighteenth century has been "changed utterly" by the advent of "contextual scholarship in the history of ideas, methodological 'externalism,' new approaches within Marxism and French structuralism, the techniques of historians of art, religion, philosophy, and ideology, the seminal writings of anthropologists and psychologists, the anti-science temper of the counter-culture in the late 1960s, and the question marks hanging over science in an age of demographic, ecological and technological crisis" (pp. 1–2).

Rom Harré, more than any other contributor to the volume, still believes in the existence of the Enlightenment, but he also believes that it needs reinterpretation. He gives us three historical "myths" that he wishes to explode. These are the myth